II. Observations upon the Hemipterous Insects composing the Genus Syrtis of Fabricius, or the Family Phymatites of Laporte, with a Monograph of the Genus Macrocephalus. By J. O. Westwood.

#### [Read October 2, 1837.]

The very singular structure of the insects composing this little group, combined with the very great rarity of the species of which the genus *Macrocephalus* is composed, will, I am sure, be deemed considerations of sufficient interest for bespeaking the attention of the Entomological Society to a few observations upon the group itself, and to a description of the species composing the genus in question; of which I have hitherto seen no specimens except in the Collections of the Royal Museums of Berlin and Paris, and those in my own cabinet, all of the latter having evidently, from their labels, been obtained from Mr. Abbot of Georgia, of which country they are natives.

The earliest notices of this group are to be found in the works of Linnæus, Geoffroy, Sulzer, De Geer, and Schellenberg, wherein two of the species were described as species of the genus Cimex, and rudely figured. Swederus however first proposed the generic separation of some of these insects having a very large scutellum from the great genus Cimex, under the name of Macrocephalus, in the Swedish Transactions for 1787; having for its type the M. cimicoides, an inhabitant of the southern states of North America, and which, together with other insects observed in the cabinets of Drury and other English Entomologists during a visit to England, he described on his return to Sweden in 1787. In 1802, Latreille proposed another genus, Phymata, in the third volume of his Histoire Naturelle, &c., the type being the European species previously described by Fabricius as an Acanthia (A. crassipes).

In the following year, 1803, Fabricius, unacquainted with the establishment of the genera Macrocephalus and Phymata, described the genus Syrtis in his Systema Rhyngotorum, into which he introduced the species of both genera, Macrocephalus and Phymata. It is essential, however, to observe the precise manner in which he treated the species of this new genus, as it affords another instance of the necessity for the adoption of the principle which I have elsewhere endeavoured to illustrate, namely, that it is essential in subdividing any old and extensive genus to retain the old generic name for that particular species which can be clearly shown to have been the insect which the author of the old genus

had most particularly in view when he proposed such genus, and which he consequently regarded as its express type.

The first species of the genus Syrtis was the European Acanthia crassipes, which we have already seen Latreille had expressly given as the type of his genus Phymata. If therefore there existed no other means of identifying the Fabrician type of the genus Syrtis, I maintain that we ought to regard Syrtis as synonymous with Phymata, although it may (as indeed in this case it does) happen, that the genus Syrtis contained species not generically identical with the first species.

But in this case there is no such uncertainty. The second Fabrician species of Syrtis was the American Cimex erosus of Linnæus, and from this insect the characters of the mouth were expressly drawn by Fabricius: supposing therefore, for a moment, that every other species placed by Fabricius in the genus Syrtis, were now ascertained to be generically distinct from this species dissected by Fabricius, it must be quite clear that the erosus was the true type of Syrtis, and the only species which ought to remain therein; and my opinion upon the matter is, that in case such typical species had previously received from some other author a distinct generic appellation, it would not only tend to confusion, but would be decidedly improper to apply the name Syrtis to any other insect placed by Fabricius in that genus, which did not possess the character of such type. Of the impropriety of such a step this very genus affords an instance; for the last three Fabrician species do not correspond with the type, indeed Fabricius himself says, "Ultimæ tres species ab hoc genere differe videntur-forte proprii generis;" and yet by adopting the principle advocated by some authors (viz., that it is proper to employ a second synonymical generic name for species not according with the type of the second genus, although placed therein), it would be as correct to retain the generic name Syrtis for these three discrepant species, as to appropriate such generic name to any other species not agreeing with the type.

It is true that these three species belong to the genus *Macrocephalus* first above-mentioned, but by not attending to the other species of the Fabrician *Syrtis*, there has been additional confusion introduced even into this little group.

From what has been said it will be seen that the three generic names thus far introduced into the group are—

- 1. Macrocephalus Swederus; (true type, M. cimicoides.)
- 2. Phymata Latreille; (true type, Acanthia crassipes.)
- 3. Syrtis Fabricius; (true type, Cimex crosus, Linn.)

In the Genera Crustaceorum, &c., Latreille however united the two last named groups into one genus, Phymata, divided into two sections from the supposed variation in the structure of the antennæ; the first section having Ph. crassipes and the second Cimex erosus for the type.

Laporte, however, in his Revision of the Hemiptera, published in Guérin's Magazin de Zoologie, has again introduced three genera into the group, namely,—1. Phymata, having crassipes as its type; 2. Discomerus, Laporte, having crosus as its type, with the Latreillian character obtained from the antennæ alone, and the observation "le génre a tous les autres caractères des Phymates;" and 3. Macrocephalus, with M. cimicoides (or the manicata, Fabr.)

From the review of the genera given above, it will however be at once perceived that if the *Cimex erosus* be generically distinct from the *Phymata crassipes*, the generic name of *Syrtis* must be given to it, and that it is improper to apply a new generic name to it.

The synonymy of these groups would then stand thus:-

- 1. Macrocephalus, Sw. Syrtis, pais aberrans, Fab. 1803. Typ. M. cimicoides, Sw. (Syrtis manicata, Fab.)
- 2. Phymata, Latreille, Syrtis, pars aberrans, Fab. 1802. Typ. Syrtis crassipes, Phymata, Laporte . . . . . 1833. Fab.
- 3. Syrtis, Fab. pars { Phymata, sect. 2, Latreille, 1807. } Typ. Cimex erosus, typica, 1803. { Discomerus, Laporte.....1833. } Linn.

These observations (made with the view of again pointing out the disadvantages arising to science from the still too prevalent inattention to generic types), presuppose the generic distinction of these three groups; but a careful revision of the insects themselves prove most decidedly that Latreille had established his two sections of *Phymata* upon sexual characters alone, and that Laporte, in adopting Latreille's sectional character as that of his new genus *Discomerus*, proposed a group which cannot be maintained. In this view therefore the synonymy of the groups will run thus:

- 1. Macrocephalus, Swederus, ut supra.
- Phymata, Latreille, 1802, (e Syrtide haud genericè distincta).
  - Syn. Syrtis, Fabricius, pars typica et (partim) aberrans, 1803.

Phymata, sect. 1 et 2, Latreille, 1807. Phymata et Discomerus, Laporte, 1833.

Respecting the structural characters of these insects, the most remarkable, and which exists throughout, and in fact distinguishes

the group, is the singular form of the fore legs, which are raptorial, the femora being very large and nearly oval, or more properly compresso-subtrigonate, having the anterior and lower part much compressed, regularly curved, and armed with very minute and numerous teeth forming a saw. Latreille describes this part as channelled for the reception of the curved tibia, but this is not the case. The tibiæ which have a curve equivalent to the curve of the femoral margin are very acute at the tips, and furnished within with a series of minute teeth similar to those of the femora. They are about half the length of the femora, extending to a strong hook on the under margin of the latter. There is no trace of a tarsus to be observed in the fore legs. Latreille, however, says the tarsi are minute and bent back upon the tibia, but such is certainly not the case. The four hind legs are of the ordinary form, the tarsi being apparently only two-jointed, the basal joint being exceedingly small. Latreille describes them as 3jointed, but Leon Dufour says they have only two joints. With a high-powered lens the posterior tarsus in M. cimicoides exhibited the appearance represented in Pl. 2, fig. 4c.

The basal joint or trochanter, as in all raptorial legs, is greatly

enlarged, so as to give additional motion to the leg.

Of the natural affinities of these insects, Leon Dufour has observed that their internal organization fully confirms the place assigned to them by Latrielle between Mirus and Aradus. Their general external structure is however much more analogous to the latter than to the former group.

The genus Phymata is distinguished by the more elongated antennæ, which are bent back during repose and rest within a lateral groove of the thorax; the scutellum is of small size, and the membrane of the hemelytra is considerably reticulated.

In the real type of this genus (P. crassipes), the antennæ of the male (fig. 2 a) are terminated by a cylindrical joint, thicker than the three preceding and rather longer than the three conjointly; the female antennæ, on the contrary (fig. 2 c), are terminated by a more clavate joint, scarcely so long as the two preceding joints. The peculiar character of the neuration of the hemelytra will be seen in fig. 2 c, and of the extremity of the male abdomen in fig. 2 c, and of that of the female in fig. 2 c.

In Phymata crosa (Discomerus crosus, Laporte), the male antennæ (fig. 3 a) are terminated by a slightly clavate joint, at least as long as the preceding joints conjointly, whilst the last joint of the female antennæ is about the length of the two preceding joints

(a minute apparent joint at the base of the third joint not being computed) (fig. 3e). The neuration of the hemelytra (fig. 3e), and the male (fig. 3e) and female abdomen (fig. 3e), are almost identical with those of *Phymata crassipes*.

Thus it will be seen that Latreille characterized his first section from a male specimen of *Phymata crassipes*, and his second section

from a female of Phymata crosa.

The following is a description of a new and remarkable species in this genus which differs in several respects from its generic characters.

Phymata integra (n. s.) (Pl. 2, fig. 1.)

Pallidè albido-lutea, thorace elongato, antice attenuato, lateribus subrectis, capite haud bifido.

Long. corp. lin.  $5\frac{1}{2}$ .

Habitat — ? In Mus. Britannic.

Totum corpus pallidè albido-luteum, abdominis marginibus fusco-maculatis; hemelytrorum corium concolor, membrana apicalis subhyalina, nubilâ fuscâ versus basin, venis pallidis. Pedes antici concolores, femora postica fasciâ centrali apiceque fuscis, tibiis tarsisque fuscis, illis fasciâ mediâ luteâ. Abdomen lateribus rotundatis, nec angulatis. Thorax elongatus, antice attenuatus, in medio transversê sulcatus, portione posticâ carinis duabus divergentibus, lateribus fere rectis; angulis posticis lateralibus margineque postico utrinque versus basin scutelli tuberculatis. Caput crassissimum, antice haud bifidum; antennæ mutilatæ, articulo 1mo brevissimo, 2do brevi.

Obs.—E *Phymatis* reliquis differt thorace elongato lateribus fere recto, abdomine rotundato capiteque integro. (Pl. 2, fig. 1 a.)

The genus Macrocephalus is distinguished by having the antennæ short and thick (fig. 4a), alike in both sexes, inserted at the front of the head, generally porrected and not reposing in a lateral groove of the thorax, the head being in fact too long and cylindrical to admit of it; the scutellum is very large, covering the entire hemelytra and wings, and extending to the extremity of the body as in the genus Scutellera, &c., leaving however the sides of the abdomen exposed: the hemelytra being thus protected have the leathery part greatly reduced in size, and the membranous part enlarged; the veins are also very few in number (fig. 4e). The rostrum is about as long as the head (fig. 4e, b). The fore leg is represented in fig. 4e, the hind tarsi in 4e, the extremity of the male abdomen in 4e, and of the female in 4e.

The species of this genus are exclusively confined to the warmer regions of America, being found from Carolina to Brazil; they are of small size, never attaining to the length of half an inch. Their colours are generally variegated with buff, luteous, reddish, brown, or black; the upper surface of the body is generally more or less rugose, and clothed with minute rigid scales. Nothing is recorded of their habits: their motions in all probability, judging from the structure of their legs, are slow and awkward.

# Sp. 1. Macrocephalus cimicoides, Swederus. (Pl. 2, fig. 5 and 5 a.)

- "Grisco-ferrugineus, scutello cinerascente maculâ coleoptratâ flavâ, alis purpurascenti-violaceis, tibiis anticis incrassatis.
- "Habitat in Georgia Americæ. Mus. D. Drury.
- "Descr.—Corpus Cim. croso L. paulo minus, griseo-ferrugineum.
- "Caput longitudine fere thoracis, antice emarginatum, subtus canaliculatum, pro rostro lateribus inferioribus serrato-cre-Antennæ longitudine capitis, griseo-ferrugineæ. Rostrum brunneum, subglabrum, apice subpilosum. Setæ flavescentes. Thorax antice angustatus, emarginatus, angulis subacutis, postice subrotundatus, lateribus spinosus, spinâ utringue obtusâ truncatâ vix bifidâ. Lineæ 2 dorsales elevatæ, obsoletiores, sordidè flavescentes. Scutellum apice rotundatum cinerascens, atomis fuscis adspersum, basi nigroustulatum, macula oblonga postice subtriloba elevato-coleoptrata, flavissima notatum. Abdomen scutello latius subrhombeum integrum, subtus saturatius ferrugineum. purpurascente-violaceæ, margine exteriori, ut in Cimicibus, usque ad medium subcoriaceo, griseo-cinereo. Pedes grisei. Tibiæ anticæ valde incrassatæ, subtus dente subacuto, apice ungulo longiori arcuato subulato armatæ." Swederus, Act. Holm. 1787, p. 185, pl. 8, fig. 1, with details from which figures 5 and 5 a are copied.

Obs. 1.—Syrtis manicata Fabr. (Syst. Rhyng. p. 123, No. 7) a Latreillio (Gen. Crust. vol. 3, p. 138) eadem cum præcedente habetur. In descriptione Fabriciana insectum coloris grisei ("S.— grisea, scutello lineâ dorsali baseos albâ."—"Thorax griseus."—" Scutellum griseum") describitur, cum patria Carolina.

Obs. 2.—Syrtis manicata, Wolff, (Icon. Cimicum, t. 17, f. 163. Encycl. Méth. Ins. pl. 374, fig. 7), certe species distincta; forsan M. affinis, Guér.

Obs. 3.—In musæo regio Berolinensi insectum hujus generis sub nomine M. manicatæ asservatur, coloris fuscescenti-ferruginei, thoracis parte posticâ magis griseâ lineis duabus elevatis divergentibus, pallidioribus; antennis pedibusque pallidê fulvescentibus; scutello vero ut in M. cimicoide, Swed. Long. corp.  $4\frac{1}{2}$  lin. An eadem?

Obs. 4.—Insectum denique possideo coloris griseo-ferruginei, cum parte elevatâ thoracis squamis griseis pallidioribus obsitâ, antennis nigris, articulo ultimo fusco; corpore subtus pedibusque griseo-ferrugineis, scutello basi parum obscuriori, colore ferrugineo magis intenso, maculâ pallidâ basali ut in *M. cimicoide*, Swed.; thorace lineis duabus divergentibus paullo elevatis, at vix pallidioribus. Long. corp. lin. 4. Habitat in Georgia Americæ. An varietas *M. cimicoides*? vix species distincta.

# Sp. 2. Macrocephalus notatus. (n. s.)

M. pallidè fuscus, punctatissimus; capite cum antennis obscurè fuscis, thoracis parte anticâ rufescenti; capitis lateribus subrufis, pedibus lutescentibus; scutello maculâ magnâ subrhombicâ, dimidium basale scutelli occupante, albidâ, punctisque duobus oblongis subapicalibus nigris.

Long. corp. lin. 33.

Habitat in Colombia. D. Lebas. In Mus. Reg. Parisiis. Variat macula ad basin scutelli angustiori. Habitat "Ouest Capitanerie des Mines."

Obs.—M. cimicoidi valdè affinis.

# Sp. 3. Macrocephalus tuberosus, Klug. (n. s.)

M. fuscus, thorace scutelloque subgranulatis, capite et thoracis parte anticâ pallidè ochraceis; antennis pedibusque albidoluteis; scutello maculâ ovato-hastatâ e basi ultra medium scutelli extensâ, haud elevatâ, lineisque duabus basalibus obscuris notato.

Long. corp. lin.  $4\frac{1}{2}$ .

Habitat Cassapava Brasiliâ. D. Sello. Mus. Reg. Berol. Macrocephalus tuberosus, Klug, MSS.

# Sp. 4. Macrocephalus obscurus. (n. s.)

M. pallidè griseo-lutescens, capite cum antennis, corpore subtus cum pedibus et thoracis parte anticâ luteo-fulvescentibus, hujus parte posticâ obscuriori, et, quam in M. cimicoide, paullo longiori; angulis lateralibus magis truncatis subbifidis, lineisque duabus paullo elevatis divergentibus; scutello ad basin obscuriori, maculâ oblongo-obovatâ ad dimidium scutelli extensâ, lineâque elevatâ tenuissimâ ad apicem currente.

Long. corp. lin.  $3\frac{1}{2}$ .

Habitat in America Meridionali. D. D'Orbigny (No. 167).

In Mus. Reg. Parisiis, et nostr.

Obs.-M. tuberoso, Klug, affinis at minor.

# Sp. 5. Macrocephalus pulchellus, Klug. (n. s.)

M. ochraceus, capitis disco thoraceque fuscis, hujus margine tenui maculisque duabus ovalibus disci obliquè positis pallidis; parte posticâ vix elevatâ; antennis pedibusque ochraceis, illarum apicibus paullo obscurioribus, scutello nigro albido-maculato et fasciato.

Long. corp. lin. 21/4.

Habitat in Insulâ Cubâ. D. Muller. In Mus. Reg. Berol.

Macrocephalus pulchellus, Klug, MSS.

Scutellum nigrum; angulis humeralibus, puncto triangulari basali, lunulâ parvâ ante medium, fasciâ latâ mediâ, antice emarginatâ, apiceque ipso scutelli albidis.

# Sp. 6. Macrocephalus leucographus, Klug. (n. s.)

M. corpore obscurè lutescenti, capite supra nigro, antennis fuscis, thorace et scutello maculis albidis variis; abdominis lateribus detectis fulvis, annulis nigris.

Long. corp. lin. 31/4.

Habitat in Insulâ Heyti, Port au Prince. In Mus. Reg. Berol.

M. leucographus, Klug, MSS.

Thorax niger, margine tenuissimo (in medio interne paullo producto) maculisque duabus parvis obliquis albidis, disco parum rufescenti. Scutellum nigrum, maculâ oblongâ basali postice obliquè bifidâ, alterisque tribus ovalibus posticis (scil. 2, 1) albis. Pedes pallidè albidi, femoribus anticis nigris, geniculis pallidis.

Var. a. Thorace toto nigro; maculis scutellaribus ut supra de-

scriptis.

Var. β. Nigricans, squamis perpaucis, fascias duas in medio scutelli interruptas formantibus, pedibus nigris, tarsis obscurè albis.

Var. γ. Fortè immatura. Luteo-fulva, scutello ut in typo, at multo obscurius, maculato.

# Sp. 7. Macrocephalus crassimanus, Fabricius.

M. pallidè luteo-flavescens, squamis luteis obsitus; capite, antennis, et parte posticâ thoracis (vix elevatâ) ferrugineis; thorace postice utrinque subspinoso, scutello concolori, subplano, carinâ centrali deficienti; pedibus 4 posticis obscurê ferrugineis, hemelytrorum corio ferrugineo, membrana hyalina.

Long. corp. lin.  $4\frac{1}{2}$ .

Habitat in America Meridionali, "St. Jean." In Mus. Reg. Berol.

Fabricius, Syst. Rhyng. p. 123, No. 9. (Syrtis crassimana.)

# Sp. 8. Macrocephalus affinis, Guérin.

M. fuscus, aureo-sericeus, thorace postice elevato, rugoso, in medio tuberculis duobus elevatis instructo; scutello lutescente, basi obscuriori, carinâ elevatâ dorsali ad apicem extensâ, (ante medium paullo latiori et postice attenuatâ); antennis fuscis, pedibus anticis nigricantibus, 4 posticis luteis.

Long. corp. lin.  $5\frac{1}{4}$ .

Habitat in Brasilia. Mus. Reg. Berol., nostr. & Q.

Macrocephalus affinis, Guérin, Icon. R. An. Ins. pl. 56, fig. 10. .
M. tuberculatus, Klug, MSS.

Caput rugoso-punctatum, lineis duabus impressis ante ocellos. Antennæ fuscæ, apice articuli quarti rufescenti. Thorax lateribus valde emarginatis, parte posticâ dilatatâ colore clariori, abdomen luteum. Scutellum basi subpunctatum, postice coriaceo-granulatum, corium hemelytrorum luteum. Tubercula elevata thoracis, antice lunulâ fuscâ plus minusve conspicuâ ornantur.

# Sp. 9. Macrocephalus prehensilis, Fabricius.

M. pallidè griseo-lutescens; capite et thorace supra (margine tenuissimo laterali excepto) nigris aut obscurè fuscis, hujus angulis posticis obtusis integris; antennis articulis terminalibus fuscis, scutello lineâ dorsali late nigrà, carinâ centrali tenuissimâ parum elevatâ, et versus basin coloris albidi; pedibus lutescentibus, hemelytrorum corio lutescenti, membrana hyalina.

Long. corp. lin.  $2\frac{1}{2}$ .

Habitat in Georgia Americae. In Mus. Reg. Berol. et nostro (c Mus. Haworthii).

Fabricius, Syst. Rhyng. p. 123, No. 8. (Syrtis prehensilis.) Wolff, Icon. Cimic. t. 17, f. 164. (E Carolina.)

Obs.—Fabricius species duas forsan his verbis confundit: "Color variat nunc griseus punctis aliquot scutelli nigris, nunc niger scutello griseo lineâ dorsali late nigrâ. Corpus semper griseum."

Sp. 10. Macrocephalus pallidus. (n. s.)

M. pallidè luteo-ochraceus, scutello lutescenti, undique punctato, lineâ tenui dorsali lævi, thorace lateribus subemarginatis angulis posticis obtusè productis, disco antico lineis tribus subelevatis punctisque quatuor profundis, transversè positis ante medium disci; pedibus, antennis et corpore subtus concoloribus, abdomine magis fulvo; hemelytrorum corio luteo, membrana hyalina.

Long. corp. lin. 22.

Habitat in Georgia Americæ. Mus. nostr.

Obs.—M. prehensili affinis, at major.

Sp. 11. Macrocephalus macilentus. (n. s.) (Tab. 2, fig. 6.)

M. elongatus, angustus, punctatus, squamis minutis albidis obsitus; capite supra cum antennis fuscis; thorace antice luteo-fulvo, parte posticâ vix elevatâ fuscâ, angulis posticis prominentibus acutis, scutello fusco ad basin subferrugineo, carinâ centrali parum elevatâ.

Long. corp. lin.  $3\frac{3}{4}$ .

Habitat in Colombia. D. Lebas. In Mus. Reg. Parisiis.

Abdomen oblongum, lateribus parallelis, postice rotundatum. Caput et thorax cum pedibus anticis pallidè luteo-fulvis, pedibus 4 posticis brunneis, femoribus basi lutescentibus. Abdomen subtus pallidè luteo-rufescens.

There still remains to be described a remarkable insect which I have only seen in the collection of the Jardin des Plantes, which seems intermediate between Macrocephalus and Phymata, agreeing with the former in its general characters, and with the latter in the diminished size of the scutellum. The structure of the antennæ and the neuration of the hemelytra however clearly prove this insect to be nearest to the genus Macrocephalus. It will be necessary, consequently, to establish a distinct sub-genus for its reception, which may be termed

OXYTHYREUS, from the acute apex of the scutellum.

Antennæ (fig. 7a) capite longiores; articulo 1mo crasso, 2do et 3tio brevissimis, 4to præcedentibus simul sumtis duplo

longiori subcylindrico, in canali ad latera thoracis haud receptæ. Caput brevius, antice bifidum. Thorax angulis posticis acutis prominulis. Scutellum triangulare, postice acutum, et ad medium abdominis fere attingens. Hemelytrorum venæ fere ut in *Macrocephalis veris* dispositæ (fig. 7 b). Abdomen ovatum, planum, lateribus in medio in angulum haud productis, thorace multo latius (fig. 7 c, extremity of the female abdomen).

Sp. 1. (12.) Macrocephalus (Hemithyreus) cylindricornis. (n. s.) Tab. 2, fig. 7.

Totus pallidè rufescenti-lutescens, punctatus, pedibus nonnihil pallidioribus, membrana hemelytrorum hyalina, thorace postice vix elevato, angulis posticis prominulis, acutis.

Long. corp. lin.  $5\frac{1}{2}$ .

Habitat ignotus. In Mus. Reg. Parisiis.

III. Description of a new Sub-Genus of Exotic Hemipterous Insects. By J. O. Westwood.

[Read 6 November, 1837.]

Since the last meeting of this Society,—at which I read a monograph on the genus Macrocephalus of Swederus, (a group distinguished by the large size of the scutellum, which entirely covers the abdomen), and in which it became necessary to establish a sub-genus upon an insect in the national museum of France, having the scutellum only extending half the length of the abdomen, and very acutely pointed at its tip—I have met with another singular group belonging to the same genus in the essential characters of the form of the body, and in the general disposition of the veins of the apical membrane of the hemelytra; but likewise differing in the small size of the scutellum, which is rounded at its tip, and which cannot be associated with the subgenus Oxythyreus above mentioned. From the obtuse form of the short scutellum, which is its most characteristic distinction, it may be named subgenerically

#### AMBLYTHYREUS.

Corpus planum, lateribus valdè dilatatum.

Caput angustum, oblongum, apice bifidum, oculis lateralibus, ocellis 2 posticis.